january 2008

canopus

monthly newsletter of the johannesburg centre of assa

Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg
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The Earth at night showing the city lights and our thin layer of atmosphere (Blue Marble map by NASA)

contents

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notice of next meeting – assa johannesburg

The next monthly meeting of the Johannesburg Centre of the Astronomical Society of Southern Africa will be held at the old Republic Observatory, 18a Gill Street, Observatory, Johannesburg on Wednesday, 9 January 2008 at 20h00. . Guest Speaker:

Prof. Roy Booth

"Millimetre-Wave Astronomy"

assa johannesburg calendar

Date	Event	Details
09 January	Monthly Meeting	Observatory @ 20:00 – Prof. Roy Booth
12 January	Mars Evening (Saturday)	Observatory @ 19:00 - Bring & Braai @ 20:00 - Johan Smit: "Mars"
09 February	Committee Meeting	War museum @ 14:00
13 February	Monthly Meeting	Observatory @ 20:00 - (TBA)

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Don't forget the Mars Evening on Saturday 12 January to celebrate Mars Opposition!

7:00 pm: Bring-and-braai (weather permitting)
8:00 pm: "Mars" presentation by Johan Smit of ASSA Pretoria
8.30 pm: Viewing of Mars and other objects through the 26" Innes telescope and the telescopes on the Observatory hill.
Venue: Observatory Dome

editorial

by Claire Lee

The beginning of a new year always holds so much promise, with resolutions being made (and broken again!) and a whole 12 months of opportunity lying ahead. If you stop to think about it, it is rather odd that all the festivities should arise from a single arbitrarily-defined point in the Earth's orbit. But try as you might to ignore the fireworks and champagne, it's impossible to not feel at least a twinge of excitement and regret as the clock ticks over to midnight; excitement for the year ahead, and regret for another year that has passed, never to be regained.

It seems that years are flying by faster and faster these days… the years absolutely did not go by that fast when we were younger, I'm sure. I have a theory about this though: the years just seem to go faster because as we get older, each year represents a smaller proportion of our entire lives. That is, when we were 4, one year is a whole quarter of our entire life, but at, say, 40, one year accounts for only 2 ½% of all our life experiences.

I was sent the picture on the front cover in a PowerPoint presentation via email. After doing some Googling I discovered that it came from NASA's beautiful "Blue Marble" Earth images, in particular from their "Next Generation" collection, showing cloudless, colour enhanced images of the entire Earth.

The original "Blue Marble" was a composite of four months of observations with a resolution of 1 km² per pixel – the Next Generation collections span an entire year with a spatial resolution of 500m! The biggest improvement, however, is a new technique that allows the computer to automatically recognise and remove cloud covered or bad data (this was previously done manually).

Night time pictures are made by darkening daylight land surface maps, and city lights are taken from 9 months of observations and superimposed. And it's not just pretty pictures either, NASA scientists are now using these results to track global urbanisation, and the impact it has on our ecosystem.

And of course, I can't help but wonder if all Eskom's load shedding fun is leaving them scratching their heads in frustration! ■

chairman's chat

by Robert Groess

It's the time of festivities and New Year's resolutions. It's also a whisker past the December solstice, and we are making the most out of the summer sunshine at our balmy latitudes. Somehow, the longer days seem to draw on and leave precious little time for using that new eyepiece flown in by Reindeer direct from the North Pole. Or is that a whole new telescope? Or stunning set of star charts?

Before Christmas fever had set in, our annual end-of-year braai was held at Chris and Claire Lee's house in Brackendowns, and turned out to be a great success. Sure there was still that nasty street light to deal with. And what about all those rain clouds? In any event, the rain certainly did not dampen any spirits, in fact, may have even led to a more tightly-knit conversation under the lapa. A big word of thanks goes out to Chris and Claire for having us as their guests and for the first class catering (tables, chairs, salads, rolls, gas braais, Christmas crackers!!) they had organised. Not only that, but we also collected a large bag full of brand new toys and teddy bears which were donated to the Children's charity, Cotlands, on behalf of our Centre. Cotlands received the gifts with open arms and after being given a tour of their impressive centre in Turffontein, I'm delighted to announce our "donation" was spot-on. The caretaker said she will prepare the gifts as Christmas presents for the orphans, and make sure that appropriate gifts go to the relevant children. A very big thank you to all who donated items.

We start off the new year with Mars blazing high in the eastern sky at dusk, and hope to capitalise on the Red Planet's favourable appearance by making use of the 26.5 Innes Refractor at the January meeting. For those of you who haven't had a chance to look through this historic beast, it is a trip up the rack-lift that would be well worth your effort. In fact, it would be a travesty if we have even one member who has not had the opportunity to look through a telescope that is forever etched into history.

Our line-up of guest speakers for the coming year remains formidable; there are more excursions and deep-sky star parties on the horizon. ScopeX 2008 preparations are well under way. And more viewing sessions at the observatory are on the cards. Some very good reasons for keeping a close eye on the ASSA Johannesburg Diary for the coming year, and make sure you're not losing out on all the action.

With that, I wish you and your families compliments of the season and an astronomical 2008.

Until next month,
Robert. ■

what would ET see?

by MIT for astronomy.com

As astronomers become more adept at searching for, and finding, planets orbiting other stars, it's natural to wonder if anybody is looking back. Now, a team of astronomers that includes a professor from the Massachusetts Institute of Technology, has figured out just what those alien eyes might see using technologies being developed by Earth's astronomers.

According to their analysis, among other things, E.T. could probably tell that our planet's surface is divided between oceans and continents, and learn a little bit about the dynamics of our weather systems.

"Maybe somebody's looking at us right now, finding out what our rotation rate is, that is, the length of our day," says Sara Seager, associate professor of physics and the Ellen Swallow Richards Associate Professor of Planetary Sciences at MIT.

Most of the planets astronomers have discovered beyond the solar system have not actually been seen; rather, they have been indirectly observed by looking at the influence they exert on stars they orbit. But even with the most advanced telescopes planned by Earth's astronomers for use over the next several years, a planet orbiting another star would only appear as a single pixel, a single point of light, with no detail except its brightness and color. By comparison, a simple cell phone camera typically takes pictures with about a million pixels, or one megapixel.

"The goal of [our] project was to see how much information you can extract" from very limited data, Seager says. The team's conclusion: a great deal of information about a planet can be gleaned from that single pixel and the way it changes over time.

The way of analyzing the data that Seager and her co-authors studied would work for any world that has continents and bodies of liquid on its surface plus clouds in its atmosphere, even if those were made of very different materials on an alien world. For example, icy worlds with seas of liquid methane, like Saturn's moon Titan, or very hot worlds with oceans of molten silicate (which is solid rock on Earth), would show up similarly across the vastness of space.

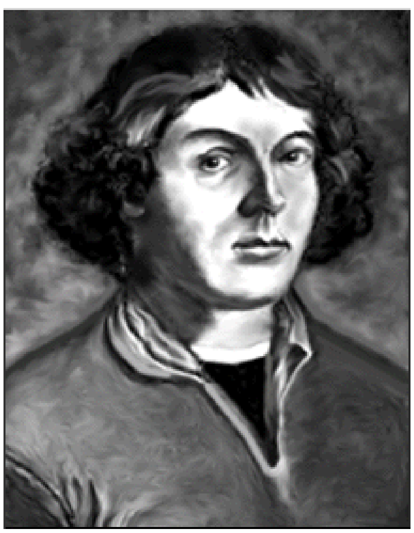
However, the method depends on clouds covering only part of a planet's surface, regardless of what each world is made of. So Titan, covered by perpetual global smog, would not give up the mysteries of its weather or rotation, nor would the hellishly hot Venus, with its complete shroud of clouds.

The key, the astronomers learned after studying data from Earth's weather satellites, is that while clouds vary from day to day, there are overall patterns that stay relatively constant, associated with where arid or rainy landmasses are. Detecting those repeating patterns would allow distant astronomers to figure out the planet's rotation period because a brightening associated with clouds above a particular continent would show up regularly once each "day," whatever the length of that day might be. Once the day's length is determined, then any variations in that period would reveal the changing weather.

No telescope now in operation is capable of making the measurements that Seager and her team analyzed. But planned telescopes such as NASA's Kepler, set for launch in 2009, would be able to discover dozens or hundreds of Earth-like worlds. Then even more advanced space observatories being considered, such as NASA's Terrestrial Planet Finder, would allow the follow-up studies to learn about these planets' rotation and weather, and the composition of their atmospheres, Seager says. ■

the Copernican myths

by Mano Singham, Physics Today, December 2007



Perhaps the most famous of all scientific revolutions is the one associated with Nicolaus Copernicus (1473-1543). The popular version of the story goes as follows:

The ancient Greeks, although they were great philosophers and good at mapping the motions of stars and planets, tended to create models of the universe that were more influenced by philosophical, aesthetic, and religious considerations than by observation and experiment. The idea that Earth was the stationary centre of the universe, and that the stars and planets were embedded in spheres that rotated around Earth, appealed to them because the circle and the sphere were the most perfect geometric shapes.

In the Christian era, the model also pleased religious people because it gave pride of place to human beings – God's special creation. The prestige of Greek philosophers like Aristotle was so great, and commitment to religious doctrine so strong, that many scholars stubbornly tried to retain Ptolemaic astronomy even though increasingly complicated epicycles had to be added to make the system work even moderately well.

So when Copernicus came along with the correct heliocentric system, his ideas were fiercely opposed by the Roman Catholic Church because they displaced Earth from the centre, and that was seen as both a demotion for human beings and contrary to the teachings of Aristotle. Therefore the Inquisition persecuted, tortured, and even killed those who advocated Copernican ideas.

Because of the church's adherence to philosophical and religious dogma, scientific progress was held back for a millennium. It was the later work of Tycho Brahe (1546-1601), Johannes Kepler (1571-1630), Galileo Galilei (1564-1642), and Isaac Newton (1642-1727) that finally led to the acceptance of heliocentrism.

Variations on this breezy version of the Copernicus story are common in science textbooks! How much of the story is true? Apart from the final sentence, not much. But it's a good illustration of how scientific folklore can replace actual history.

Let us start with the myth that the Copernican model was opposed because it was a blow to human pride, dethroning Earth from its privileged position as the centre of the universe. Dennis Danielson, in his fine article on the subject shows how widespread that view is by quoting the eminent geneticist Theodosius Dobzhansky. With Copernicus, Dobzhansky contends, "Earth was dethroned from its presumed centrality and preeminence." Carl Sagan described Copernicanism as the first of a series of "Great Demotions ... delivered to human pride." Astronomer Martin Rees has written, "It is over 400 years since Copernicus dethroned the Earth from the privileged position that Ptolemy's cosmology accorded it." And Sigmund Freud remarked that Copernicus provoked outrage by his slight against humankind's "naive self-love."

The squalid basement

Danielson, however, points out that in the early 16th century, the centre of the universe was not considered a desirable place to be. "In most medieval interpretations of Aristotelian and Ptolemaic cosmology, Earth's position at the centre of the universe was taken as evidence not of its importance but ... its grossness."

In fact, ancient and medieval Arabic, Jewish, and Christian scholars believed that the centre was the worst part of the universe, a kind of squalid basement where all the muck collected. One medieval writer described Earth's location as "the excrementary and filthy parts of the lower world." We humans, another asserted, are "lodged here in the dirt and filth of the world, nailed and rivetted to the worst and deadest part of the universe, in the lowest story of the house, and most remote from the heavenly arch." In 1615 Cardinal Robert Bellarmine, a prominent persecutor of Galileo, said that "the Earth is very far from heaven and sits motionless at the centre of the world."

In Dante Alighieri's *The Divine Comedy,* hell itself is placed in Earth's innermost core. Dante also speaks of hell in ways consistent with Aristotelian dynamics – not full of flames, which would be displaced skyward by the heavier Earth, but as frozen and immobile.

By contrast, heaven was up, and the further up you went, away from the centre, the better it was. So Copernicus, by putting the Sun at the centre and Earth in orbit around it, was really giving its inhabitants a promotion by taking them closer to the heavens.

When and why did the history become distorted? Danielson doesn't pinpoint when the erroneous view gained supremacy, but he says that from 1650 onward one can find some writers making this revisionist claim. By the late 18th century it had taken hold completely. Johann Wolfgang von Goethe (1749-1832), for example, wrote: "Perhaps no discovery or opinion ever produced a greater effect on the human spirit than did the teaching of Copernicus. No sooner was the Earth recognized as being round and self-contained, than it was obliged to relinquish the colossal privilege of being the centre of the world." Here Goethe managed to propagate another major distortion: the.notion that before Copernicus (and Columbus) it was not known that Earth was a sphere.

Aristotle's cosmology

Even Aristotle did not believe Earth to be the centre of the universe. He thought it rather to be *at* the centre. This fine distinction was not driven by religious dogma or human selfimportance but by physics arguments: In Aristotle's cosmology the universe was finite and the heavens existed beyond its outermost sphere. The universe had a centre-defined as the centre of the large outer sphere in which the stars were embedded – and matter was drawn to that centre. In that cosmology, "up" and "down" were well defined. "Down" was toward the centre of the universe and "up" was away from it, toward the sphere containing the stars.


NICOLAI COPERNICI TO-
RINENSIS DE REVOLVTIONI-
bus orbium cœlestium,
Libri VI.
IN QVIBVS STELLARVM ET FI-
XARVM ET ERRATICARVM MOTVS, EX VETE-
ribus atq; recentibus obseruationibus, restituit hic autor.
Præterea tabulas expeditas luculentasq; addidit, ex qui-
bus eosdem motus ad quoduis tempus Mathe-
matum studiosus facillime calcu-
lare poterit.
ITEM, DE LIBRIS REVOLVTIONVM NICOLAI
Copernici Narratio prima, per M. Georgium Ioachi-
mum Rheticum ad D. Ioan. Schone-
rum scripta.
Cum Gratia & Priuilegio Cæs. Maiest.
BASILEAE, EX OFFICINA
HENRICPETRINA.

The elements were earth, air, water, and fire, and each element had its natural affinity for a location in the universe. As could be seen from the fact that rocks fell to the ground, earth, being heavy, was drawn to the centre. Flames leaping upwards showed that fire, being light, was drawn towards the heavens. The model explained many things, such as why objects fell to the ground when released from any point and why Earth's surface was spherical. It

NICOLAI COPERNICI

net, in quo terram cum orbe lunari tanquam epicyclo contineri diximus. Quinto loco Venus nono mense reducitur. Sextum denique locum Mercurius tenet, octuaginta dierum spacio circũ currens. In medio uero omnium residet Sol. Quis enim in hoc

pulcherrimo templo lampadem hanc in alio uel meliori loco poneret, quàm unde totum simul possit illuminare? Siquidem non inepte quidam lucernam mundi, alij mentem, alij rectorem uocant. Trimegistus uisibilem Deum, Sophoclis Electra intuentẽ omnia. Ita profecto tanquam in solio regali Sol residens circum agentem gubernat Astrorum familiam. Tellus quoque minime fraudatur lunari ministerio, sed ut Aristoteles de animalibus ait, maximam Luna cum terra cognationẽ habet. Cõcipit interea à Sole terra, & impregnatur annno partu. Inuenimus igitur sub hac

also explained why Earth was motionless at the centre. For it to move, there would have to be something that took it away from the centre. And no such agent was in evidence.

In his book *The Copernican Revolution,* historian Thomas Kuhn pointed out that Aristotle was clearly saying that Earth was at the centre of the universe not because it was especially important but simply because it was massive: "It so happens that the Earth and the Universe have the same centre, for the heavenly bodies do move towards the centre of the Earth, yet only incidentally, because it has its centre at the centre of the universe."

Problems with heliocentricity

Copernicus' heliocentric model, on the other hand, created all manner of difficulties. It required Earth to be in motion, but it did not say what caused it to move away from the centre. If Earth was not stationary at the centre but was midway in the sequence of planetary orbits around the Sun, how could you define "up" and "down"? Why would objects fall "down" if Earth were not at the centre of the universe? How could objects thrown upward fall back to the same point if Earth was not at rest? Earth was still believed to be the most massive object in the universe. So if it was not drawn to a fixed point at the centre, did that mean that the universe had no centre? Could that mean that the universe was infinite?

Kuhn argues that there were thus excellent reasons for rejecting the upstart Copernicus and retaining Aristotelian cosmology and its elaboration in Ptolemaic astronomy. Accepting Copernicus would not simply replace one astronomical model with another. It also meant that a whole class of physics problems that had been considered solved were now suddenly unsolved. Therefore much of the initial resistance came from within the physics and astronomy communities rather than from the church.

In fact, awareness of Copernicus' work was at first largely restricted to the community of astronomers. Only they were interested in improving the calculation of planetary motions. Copernicus was widely respected as one of Europe's leading astronomers, and reports about his work, including his heliocentric hypothesis, had been circulating since 1515. So when his *De Revolutionibus Orbium Coelestium* (On the Revolutions of the Celestial Spheres) was published 28 years later, it was hardly a surprise to other astronomers. They accepted it as the most comprehensive account of celestial motions since Ptolemy.

But most astronomers also felt that the Ptolemaic system, although complicated, could ultimately be made to work. So while they hailed Copernicus's work and used his tables and methods, they were skeptical of his central idea of a moving Earth. They dismissed it as an ad hoc trick (much as Max Planck's quantum hypothesis was initially viewed centuries later) that turned out to be a useful tool for calculations. The idea that the motion described by some artificial model was a convenient fiction was not unprecedented. Ptolemy himself had said that not all of his epicycles had to be considered physically real. Some were to be thought of as merely mathematical devices that gave sound results.

Initially, however, the Copernican system did not give better numerical results than the Ptolemaic. Part of the problem was that some of the existing astronomical observations were simply erroneous, a problem that plagued Ptolemaic and Copernican astronomy alike. Although better observations soon eliminated some of those problems, other problems remained obdurate for a long time. Furthermore, at the level of accuracy available to Copernicus, the introduction of ellipses in place of circular orbits would not have helped. What Copernicus needed to do, as historian Owen Gingerich puts it, was to "treat Earth and Mercury the same way as the other planets."

Kuhn says of Copernicus: "His full system was little if any less cumbersome than Ptolemy's had been. Both employed over thirty circles; there was little to choose between them in economy. Nor could the two systems be distinguished by their accuracy. When Copernicus had finished adding circles, his cumbersome sun-centred system gave results as accurate as Ptolemy's, but did not give more accurate results. Copernicus had failed to solve the problem of the planets."

Advantages

The Copernican model did have some aesthetic and qualitative advantages. It provided a more natural qualitative explanation for the zigzag motion of planets like Mars as observed from Earth, and it answered some important questions about the ordering of the planets. That's why heliocentrism was eventually accepted. As Kuhn puts it, *"De Revolutionibus* did convince a few of Copernicus' successors that sun-centred astronomy held the key to the problem of the planets, and these men finally provided the simple and accurate solution that Copernicus had sought."

That's an important point about scientific revolutions. At the start, the new theory rarely gives convincingly better results than its predecessor. What usually happens is that it has some appeal, often aesthetic, that attracts others to work within the new model. And if, over time, the new model proves fruitful in resolving many puzzles, it gains adherents.

The success of the Copernican model was aided by the work of the Danish astronomer Tycho Brahe, who died a few years before the invention of the telescope. Tycho is considered the greatest of the naked-eye observers. His wideranging and accurate observations had an enormous impact.

Although Tycho's pivotal role is recognized, what is less well known is that he, like most astronomers at the time, rejected Copernicus' ideas of a moving Earth. It created more problems, he thought, than it solved. But despite Tycho's opposition, his observations provided two major benefits for the heliocentric model: They got rid of some erroneous old data that had plagued all the earlier models and thus helped to remove some of the anomalies that the Copernican system couldn't explain. More important, the precision of Tycho's data provided puzzles that enabled Kepler, a convert to Copernicanism, to come up with the key idea that the motions of the planets were not circular – as Ptolemy, Copernicus, and Tycho had all assumed – but elliptical.

In the folklore that surrounds Copernicus, the introduction of elliptical orbits is rightly recognized as a crucial development that led to ultimate acceptance of his model. The pre-Keplerian astronomers, however, are unfairly characterized as insisting on circular motion because of aesthetic considerations, slavish adherence to the authority of the Greeks, and so forth. But at the time, the reasons for assuming circular motions were quite sensible. Because there were no good theories of force or gravity, one needed to have an explanation of motion. Circular motion could be explained by a plausible hand-waving argument. One could say that it was an initial condition – that once an object had been set in circular motion it would, if undisturbed, continue circling forever.

More complicated motions like elliptical orbits would mean that the planets' speeds and distances from the Sun were constantly changing. But that required a dynamical theory that simply did not exist in those pre-Newtonian times. Just introducing the idea of a moving Earth created all kinds of unsolved problems for the physical theories of the day. Adding noncircular motion would have compounded those problems, providing even stronger grounds for rejecting Copernicus.

Kepler's innovative idea of elliptical orbits, coupled with his law of areas, did let the Copernican model dispense with cumbersome epicycles. But his accurate *Rudolphine Tables* for planetary motion, published in 1627, were difficult to use. It was Newton's theories of motion and gravity, not published until 60 years later, that sealed the scientific case in favour of Copernicus by putting his model on a firm theoretical footing.

Religious objections

The actual religious reaction to the heliocentric model also differs from the folklore. For one thing, Copernicus did not seem to fear religious opposition to his ideas. After all, he was a reputable cleric himself. He even dedicated his book to Pope Paul III with a letter in which he apologized for the seeming outlandishness of his suggestion that the Earth moved. He explained that he was forced to that hypothesis by the inadequacy of the Ptolemaic system for constructing calendars and predicting the positions of stars. A cardinal and a bishop were among those who urged him to publish his book. In fact, for 60 years after Copernicus's death just two months after its publication, *De Revolutionibus* was read and at least partially taught at leading Catholic universities.

In 1600 the church did burn at the stake the philosopher Giordano Bruno, an adherent of Copernicus, for heresy. But Bruno was condemned for other heresies against Christian doctrine rather than explicitly for being a Copernican. However, the fact that Bruno had been an advocate and popularizer of heliocentrism may have led to the later perception that he was the first martyr of the new science.

For many years after the publication of *De Revolutionibus,* while Copernicus' ideas remained within the mathematical astronomy community, authors of more popular books on astronomy and cosmology were either unaware of his work or chose to ignore it. A few nonastronomers did ridicule it – not for being heretical but for promulgating the patently absurd idea of a moving Earth.

It was through popularizers, some of them poets, that Copernicus' ideas eventually became more widely known and began to spark religious opposition. But here too, the actual history is surprising. Opposition arose initially among Protestant groups rather than from the Roman Catholic Church.

Kuhn suggests that this was because Martin Luther (1483-1546) and other leaders of the Reformation were emphasizing the Bible as the fundamental source of Christian knowledge and authority. And there were manifest contradictions between the Bible and Copernicus. The Catholic Church, by focusing more on doctrinal issues, actually had greater flexibility in dealing with science.

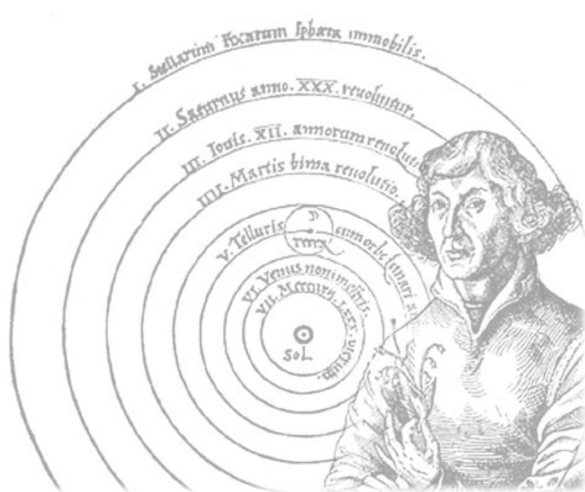
Luther spoke out against heliocentrism in 1539, saying that the idea of a moving Earth going around a stationary Sun clearly went against the account in the book of Joshua that says Joshua commanded the Sun to stand still. Luther's deputy Philipp Melanchthon followed up by finding other biblical verses that described Earth as stationary.

The conflict between scripture and Copernicanism was not limited to verses that involved the motion of Sun or Earth. The realization was growing that acceptance of Copernicanism raised other profound theological difficulties as well. As Kuhn points out, the problems just kept multiplying:

Kuhn argues that it was probably the menace of burgeoning Protestantism that caused the Catholic hierarchy in 1616 to switch abruptly from tolerance of Copernicanism to repression. "Copernican doctrines were, in fact, condemned during the Counter Reformation, just when the Church was most convulsed by internal reforms designed to meet Protestant criticism. Anti-Copernicanism seems, at least in part, one of these reforms. Another cause of the Church's increased sensitivity to Copernicanism after 1610 (the year Galileo first turned a telescope to the heavens) may well have been a delayed awakening to the fuller theological implications of the Earth's motions. In the 16^{th} century those implications had rarely been made explicit."

The idea of the Copernican model being a demotion for humanity probably first developed around 1650, after the scientific community had already accepted heliocentrism. Religious bodies undertook what was essentially a propaganda war against Copernicus. What probably happened was that after the heliocentric model had been well established, the location of the Sun did come to be perceived as a privileged place. So people read back into history the newly believed excellence of the centre and attributed that belief retrospectively to the pre-Copernicans. The demotion idea may have been introduced as part of the effort to rally nonscientific religious people to turn against Copernicanism by appealing to their pride as human beings.

The Protestant churches abandoned their opposition to Copernicanism fairly quickly when it became clear that the evidence in favour of a Sun-centred system was overwhelming. But the Catholic Church, being a much larger and more tradition-bound and bureaucratic institution, was left clinging to its anti-Copernican views for a long time. Its ban on Copernicus remained until 1822, and his book remained on the forbidden list until 1835. In fact it was only in 1992 that Pope John Paul II lifted the edict of inquisition against Galileo. Thus the Roman Catholic Church is now generally regarded as the principal villain in perhaps the most notorious episode in the history of science.



What can we learn from all this? The story of the Copernican revolution shows that the actual history of science often bears little resemblance to the popular capsule versions that are learned in school or college or portrayed in textbooks and the popular media. Steven Weinberg calls them "potted history." The true story is much more complicated, but it's also a lot more interesting."

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astro news: Asteroid may hit Mars in January

article by Francis Reddy from astronomy.com – 21 December 2007

A space rock dubbed 2007 WD_5 is taking aim on the Red Planet.

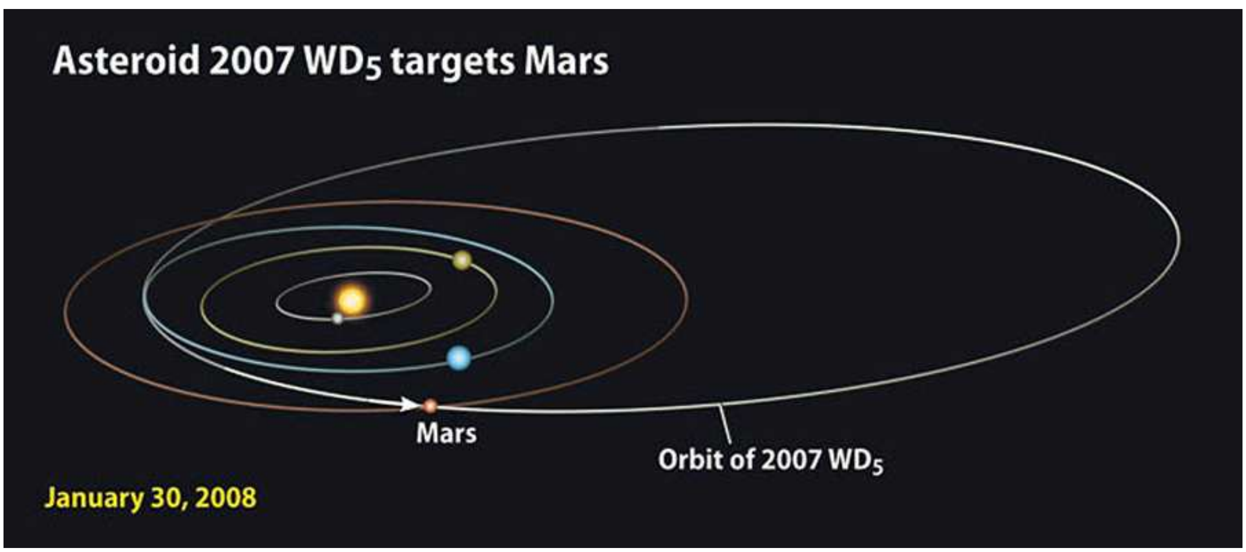
Astronomers with NASA's Near Earth Object (NEO) Program at the Jet Propulsion Laboratory in Pasadena, California, calculate the odds of a January 30 collision at 1 in 75. While this is remote, it's less so than last week's estimated 1-in-350 chance.

NEO astronomer Steve Chesley, who's used to dealing with million-to-one odds, calls the event "extremely unusual," and, in something of a twist, NEO astronomers are rooting for an impact.

An armada of spacecraft orbiting the Red Planet — the European Space Agency's Mars Express and NASA's Mars Reconnaissance Orbiter and Mars Odyssey — would have ringside seats to view the strike and its after-effects. Even Earth-based telescopes could potentially observe the impact because Mars is near opposition and, therefore, unusually close.

Astronomers say asteroid 2007 WD_5 is about 160 feet (50 meters) across. If it struck Mars, the energy would be similar to the 1908 Tunguska blast in Siberia, where a stony asteroid exploded above the taiga. The blast felled and scarred trees over 810 square miles (2,100 square km).

One difference: Tunguska was an air burst and left no crater, whereas 2007 WD_5 likely would reach Mars' surface intact. ■



Will asteroid 2007 WD_5 crash into Mars January 30? Odds it'll happen are now 1 in 75. *Roen Kelly*

reader's pics

by Bert van Winsen

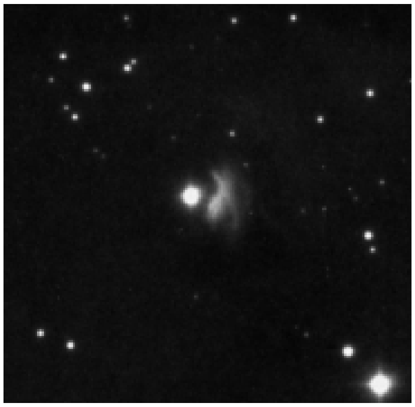
NGC 6744 is a 9th magnitude type SBc (another source says it is SBbc?) galaxy, 25 to 30 Mly away in Pavo.

It is believed to be very similar in structure to the Milky Way Galaxy. At about 150 000 ly across, it is probably of a similar size to the Milky Way, has more than a hundred thousand million stars, and, as in the case of our Magellanic clouds, also has a satellite galaxy (15th magnitude NGC 6744A), that can be seen along a faint outer spiral arm at lower right. South is left.

I had done this one before recently, but discovered afterwards that it's companion was a satellite galaxy, but outside the field of view of that image. I was also unhappy that the outer regions of the galaxy were also outside the field of view of a single frame. I therefore decided to take some additional images (equivalent to a double mosaic) and blended them in with the original image to include more of the galaxy with its satellite. It is unfortunately still too big for the double frame, as the upper extremities are still just outside the field of view. I just can't win!

focus on: ngc 1555 – Hind's Variable Star/Nebula

by Magda Streicher. Picture Credit: www.aavso.org/vstar/vsots/0201.shtml



Variable stars are not unusual, but here we have a special object accompanying such a variable star. Hind's variable star possesses a variable nebula that makes the combination unique. Russell Hind, who discovered the phenomenon, was an English astronomer employed at the George Bishop's Observatory. During an observation programme on the night of October 11th, 1852 in the north-eastern part of the Taurus constellation he found a faint glow situated fairly close to a 10 magnitude star. There was no indication of the star on the star chart Hind's was using at the time. He reasoned that it may be an asteroid or possibly a variable star. After further observation the possibility of an asteroid was excluded, as the object was not moving at all, although it varied in brightness. It was indeed a variable star, now known as T Tauri (4.4 magnitude), possibly in the region of 5 million years old. T Tauri's brightness varies between 9 and 13.5 magnitude, although it wasn't the case from 1868 up to and including 1890, when the star was below visual magnitude. The possibility now exists that T Tauri may even be a binary star about 160 light years away from our sun. Even more interesting is the fact that the nebula situated directly west of T Tauri, varies in size and form from time to time. Hind's Variable Nebula, which is a reflection emission nebula, has brightened somewhat in the past 80 years as a result of T Tauri's starlight that illuminates the gas en dust surrounding the nebula. Inside the gentle haze two dusty parts can be seen (NGC 1554 and NGC 1555), with NGC 1555 a tad brighter. The faint object is by no means an easy one to observe.

My first observation of the nebula was done as far back as December 2000, when I described it as follows: "… an extremely faint, gentle north-south wisp arc of nebulosity, close to T Tauri's western side. The nebula is somewhat dimmer towards the centre – which explains its two NGC numbers. I estimate the nebulae 11.2 magnitude taking stable magnitudes of known stars in the field of view around T Tauri." Mr. Jan Hers indicated to me that the star was approximately 11.5 magnitude at the stated date in December 2000. In December 2002 I again estimated the star to be somewhat brighter than 10.7 magnitude.

It is December again, and hopefully I can do another observation and possibly be surprised by a nebula that may be even brighter. Talking of December, enjoy your Christmas, and may you prosper in the new year. ■

Object	Other Name	Type	RA	Dec	Mag
T Tauri	HD 284419	Variable Star	04.22.0	+ 19° 32'	9-13.5
NGC 1554 NGC 1555	Hind's Nebula	Nebula	04.22.8	+ 19° 32'	3.8

the sky this month

site location: lat. **26.0 deg S** long. **28.0 deg E** local time = UT **+2.0 hrs**.

january 2008

dd hh				dd hh			
1	14	Spica 2.2N of Moon		21	23	Mercury greatest elong E(19)	
3	08	Moon at apogee		21	23	Pollux 3.7N of Moon	
4	03	Earth at perihelion		22	14	FULL MOON	
5	11	Antares 0.4N of Moon	Occn	23	08	Mercury 0.4N of Neptune	
7	11	Jupiter 4.3N of Moon		24	07	Venus 5.2S of Pluto	
8	12	NEW MOON		24	15	Regulus 0.6N of Moon	Occn
9	16	Mercury 0.3N of Moon	Occn	25	05	Saturn 2.6N of Moon	
11	02	Neptune 0.4N of Moon	Occn	28	07	Mercury stationary	
12	24	Uranus 2.3S of Moon		28	22	Spica 2.3N of Moon	
15	20	FIRST QUARTER		30	06	LAST QUARTER	
19	08	Moon at perigee		30	21	Mars stationary	
19	24	Mars 1.1S of Moon		31	04	Moon at apogee	

february 2008

dd hh				dd hh			
1	12	Venus 0.6N of Jupiter		16	08	Mars 1.5S of Moon)	
1	19	Antares 0.5N of Moon	Occn	18	08	Pollux 3.8 N of Moon	
2	21	Mercury 3.2N of Neptune		18	19	Mercury stationary	
4	7	Jupiter 3.9N of Moon		21	00	Regulus 0.7N of Moon	Occn
4	13	Venus 4.2N of Moon		21	04	FULL MOON	Eclipse
6	19	Mercury inferior conjunction		21	10	Saturn 2.5N of Moon	
7	03	Mercury 4.5N of Moon		24	10	Saturn at opposition	
7	04	NEW MOON	Eclipse	25	07	Spica 2.3N of Moon	
7	11	Neptune 0.3N of Moon	Occn	26	22	Mercury 1.2N of Venus	
9	08	Uranus 2.5S of Moon		28	01	Moon at apogee	
11	03	Neptune at conjunction		29	03	Antares 0.6N of Moon	Occn
14	00	Moon at perigee		29	03	LAST QUARTER	
14	04	FIRST QUARTER					

local times of rise and set for the sun & major planets

Date	Sun		Mercury		Venus		Mars		Jupiter		Saturn	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Jan 01	04.51	19.23	05.25	20.04	02.27	16.26	18.46	4.04	04.21	18.52	22.34	9.44
Jan 11	04.59	19.24	06.06	20.21	02.31	16.45	17.52	3.11	03.52	18.22	21.54	9.03
Jan 21	05.09	19.21	06.41	20.21	02.39	17.02	17.03	2.23	03.22	17.52	21.13	8.21
Jan 31	05.19	19.15	06.28	19.43	02.48	17.13	16.20	1.41	02.53	17.22	20.32	7.39
Feb 10	05.30	19.06	05.03	18.28	03.05	17.24	15.43	1.05	02.27	16.55	19.51	6.56
Feb 20	05.40	18.55	03.55	17.39	03.24	17.30	15.10	0.33	01.56	16.23	19.09	6.12

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